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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,853	02/08/2002	Setsunobu Wakamoto	70840/56,965	1398
21874	7590	12/28/2004	EXAMINER	
EDWARDS & ANGELL, LLP			SETH, MANAV	
P.O. BOX 55874			ART UNIT	
BOSTON, MA 02205			PAPER NUMBER	
			2625	

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/071,853

Applicant(s)

WAKAMOTO ET AL.

Examiner

Manav Seth

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 13-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 8, 10, 11 and 13-16 is/are rejected.
- 7) ☒ Claim(s) 5, 7 and 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 06/03/2002
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

- A. Specification inconsistent with the drawing:

The specification in paragraphs [0101] and [0102] is inconsistent with the drawing 5. The specification in paragraph [0101] recites "When the distortion is barrel distortion, at step 5, the F value is increased" and in paragraph [0102] recites "When the distortion is not barrel distortion (i.e., it is pincushion distortion), at step 6, the F value is decreased". The examiner finds the drawing 5 to be correct and suggests to make corrections in the specification to be consistent with the drawing 5.

- B. Redundant paragraph:

The specification recites redundant paragraphs [0019] and [0020]. The examiner suggests a correction is required by deleting one of these paragraphs to eliminate the redundancy.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 13 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 13 and 14 do not conform to current US practice. Claims 13 and 14 are an apparatus claims that reads as a long preamble, without apparatus (i.e., structural) limitations and then incorporates the method steps of claim 11 and claim 12. It appears as though the applicant is attempting to define an apparatus entirely in terms of the method of claim 11 and claim 12. However, this approach renders the claim indefinite because it is not clear:

What constitutes the "apparatus" in terms of its structure,

Where the preamble ends and the body of the claim begins; or

What structure of the apparatus in claim 13 performs the method of claim 11,

What structure of the apparatus in claim 14 performs the method of claim 12.

An apparatus claim should define the system in terms of its structure by positively reciting structural limitation. Correction and conformance to US practice is suggested.

Claim Rejections - 35 USC § 101

4. The claimed invention 35 U.S.C. 101 reads as follows:

Art Unit: 2625

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 15 and 16 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Regarding **claims 15 and 16**, they are either descriptive / non-descriptive material on a readable medium or a series of steps to be performed on a computer that merely manipulates abstract idea or solves a purely mathematical problem without any limitation to a practical application.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 4, 6, 8, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar, U.S. Patent No. 6,118,474 and further in view of Zimmermann, U.S. Patent No. 5,185,667 and further in view of Ejiri et al., U.S. Patent No. 6,366,360.

Nayar discloses an imaging system, which comprises of a reflecting mirror having a geometrical shape of a paraboloid (figure 1A; column 12, lines 35-36) which satisfies the limitation using a reflecting mirror in **claim 1**.

Nayar discloses an imaging system, which includes an imaging section comprising of a camera connected to the computer and computer further provides image processing functions on the obtained image (Figure 1A; column 7, lines 52-65). Nayar further discloses of an image signal processing for performing coordinate transformation on captured image signal to produce a perspective image (column 4, lines 5-13) and performing coordinate transformation is geometrical transformation and correction. Nayar does not teach the detailed steps of method with respect to the system components.

However, Zimmermann discloses a omniview imaging system that captures omniview wide angle images and perform image processing (figure 1 and abstract). Zimmermann further discloses the method of transforming the captured images and displaying it on the monitor. Zimmermann discloses of first step of capturing an image and storing it in the input image buffer (element 4) (column 3, lines 28-32). Zimmermann discloses the next (second) step of performing the coordinate transformation on the image stored in input image buffer according to an instruction from user to produce an corrected perspective transformed image (abstract; column 3, lines 32-43; column 2, lines). Zimmermann further discloses the next (third) step of the method of storing the

perspective transformed image in output image buffer and then displaying on the monitor or display device and these steps can be repeated for acquiring the next image.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to use the detail method steps of Zimmermann in the invention of Nayar. One would have been motivated to use the method of the detail method steps of Zimmermann in the invention of Nayar because both Nayar and Zimmermann are directed to obtain images of wide angle view and Zimmermann further provides the detailed steps of processing the image with respect to the components which provides the user a greater detail of image processing.

Both Nayar and Zimmermann does not teach the details correcting distortion in the captured image based on a value regarding a distance between a lens position and a light-receiving surface of the imaging device. However, Ejiri discloses of an imaging systems comprising of a CCD camera and an image correction unit. Ejiri discloses of positioning the center of the lens of the camera in several positions (figure 8; column 4, lines 15-17) and further discloses the distance (R) between the center of the lens (element 1) and the light-receiving surface (3) is variable (figure 6; column 7, lines 52-58). Ejiri further discloses of correcting the captured distorted image by calculating distortion aberration coefficients based on a value regarding a distance (R) between a lens position and a light-receiving surface of the imaging device (column 7, lines 5-25 and lines 50-58). Ejiri further discloses an onboard keyboard (operation panel) or an

Art Unit: 2625

input unit (108), used to input or select a set of parameter data which is later used in correcting the distortion aberration in the image data (column 4, lines 37-40). Ejiri further discloses of setting of parameter R (column 8, lines 37-39 and column 10, lines 48-50). Adjusting the parameter R is basically adjusting the zoom level of the camera and varying zoom to further correct the image will result in change in position of image coordinates according to perspective transformation.

Therefore, it would had been obvious to one having ordinary skill in the art at the time of the invention was made to use the method of Ejiri in the combined invention of Nayar and Zimmermann. One would have been motivated to use the method of correcting the captured image by Ejiri in the invention of Nayar and Zimmermann because all references, Nayar, Zimmermann and Ejiri are directed to capture images at wide angles and performing image processing on the images captured from a curved surface (see Ejiri, column 11, lines 26-30) and Ejiri further provides the details of correcting distorted images captured at various incident angles in order to compensate the lens aberration effects (geometrical distortions). Adjusting the distance (R) between the center of the lens and the light-receiving surface will help in aligning the images to proper expected image without distortion. Correcting geometrical distortions in an image is adjusting and aligning the coordinates of the distorted image back to the proper alignment which is considered as coordinate transformation and this is well know in the art of image processing.

Claim 4 and 6 has been analyzed and rejected as per claim 1.

Claim 8 recites the components of the image processing section. Nayar does provide a computer connected to the camera and the monitor for image processing but does not teach the inner component details of the computer. Zimmermann does talk about the processing unit that controls the functions of the systems through system buses (figure 1) and also performs parameter (arithmetic) calculations (column 3, lines 37-38), input and output buffers. Both Nayar and Zimmermann don't talk about the look-up table.

However, Ejiri discloses an onboard CPU (110) connected to other part or components through buses (figure 3; column 4, lines 25-26), memory (102) (input buffer) for storing the input image data (column 4, lines 28-29), a ROM memory (look-up table) (107) which stores a predetermined parameter values of the lens and camera (column 4, lines 32-36). Ejiri further includes a subsection (figure 5, lines 5-22) which comprise of a calculation control unit (54) which works on ROM memory (look-up table) to work with the parameters (column 5, lines 19-22).

Therefore, it would had been obvious to one having ordinary skill in the art at the time of the invention was made to add the ROM memory by Ejiri in the combined invention of Nayar and Zimmermann. One would have been motivated to use ROM memory by Ejiri in the invention of Nayar and Zimmermann as a look-up table to store

Art Unit: 2625

the predetermined parameters of the camera and lens, which would be handy while correcting the image distortion.

Claim 10 additionally recites the use of software or program to control image data in an imaging system. Nayar discloses of programming the computer using software to perform the image processing (column 10, lines 57-60).

Claim 11 has been analyzed and rejected as per claim 1.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar, U.S. Patent No. 6,118,474 and further in view of Zimmermann, U.S. Patent No. 5,185,667 and further in view of Ejiri et al., U.S. Patent No. 6,366,360 and further in view of Florent et al., U.S. Patent No. 5,675,380.

Claim 3 recites "An imaging system according to claim 1, wherein a squared inspection drawing is used as the inspection drawing". Nayar, Masahiko and Ejiri does not teach of using a squared inspection drawing as the inspection drawing.

However, Florent discloses the design of a grating on a plane where the meshes of this grating are square-shaped or rectangular (figure 1A; column 6, lines 33-35). Therefore, it would had been obvious to one having ordinary skill in the art at the time of the invention was made to use the grating by Florent in the combined invention of

Art Unit: 2625

Nayar, Zimmermann and Ejiri. One would have been motivated to use the grating of Florent in the combined invention of Nayar, Zimmermann and Ejiri because Florent and all other combined references are directed towards removing or compensating the geometrical distortion in the captured image and Florent further uses the grating pattern to identify the geometrical distortion as such the deformed (radial shaped) meshes of the grating pattern will represent the geometrical distortion and this will help in finding the parameter adjusting direction of the optical parameters to remove the distortion and will further help in repositioning the distorted coordinates to the correct position.

9. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar, U.S. Patent No. 6,118,474 and further in view of Zimmermann, U.S. Patent No. 5,185,667 and further in view of Ejiri et al., U.S. Patent No. 6,366,360 and further in view of applicant's admitted prior art in application 10/071,853.

Claim 2 recites the expressions that are used to perform coordinate transformation on captured image data to produce the perspective transformed image data. Applicant is claiming these expressions as is his own invention and also applicant has admitted these expressions to be the part of the related art in the specification on page 1 of the published application 10/071853, therefore claim 2 is rejected as being the part of the related art.

Allowable Subject Matter

10. Claims 5, 7 and 9 objected to as being dependent upon a rejected base claim 1, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons of allowance:

The instant invention is directed to a method of correcting a image captured from the curved surface of the reflecting mirror. The closest prior art (Nayar, U.S. Patent No. 6,118,474) does not teach of an image recognition section where the captured image is compared to the **central projection image**. The limitation "by comparing the produced perspective transformed image to an image expected to be obtained when the captured image is a central projection image" as recited in claim 5 is not disclosed or suggested by the prior art of record. Claims 7 and 9 are dependent on claim 5, therefore they will meet the conditions of allowance as applied to claim 5.

11. Claim 12 is allowed.

The following is an examiner's statement of reasons of allowance:

The instant invention is directed to a method of correcting a image captured from the curved surface of the reflecting mirror. The closest prior art (Nayar, U.S. Patent No. 6,118,474) does not teach of an image recognition section where the captured image is compared to the **central projection image**. The limitation "a third step for comparing the perspective transformed image data stored in the output buffer memory to expected image data obtained when a captured image is a central projection image by using the image recognition section" as recited in claim 12 is not disclosed or suggested by the prior art of record.

Conclusion

12. The prior art of record and not relied upon is considered pertinent to applicant's disclosure:

- Lewis Jr et al., U.S. Patent No. 6,816,625, discloses the method for correcting image distortions that occur in image capture systems.
- Ohtani et al., U.S. Patent No. 5,528,194, discloses an apparatus and method for performing geometric transformations on an input image.
- Geng, U. S. Patent No. 6,304,285 discloses a method and apparatus for omnidirectional imaging.
- Uchida, U. S. Patent No. 6,324,297 discloses a perspective transformation on an image of skin pattern to extract the features accurately.

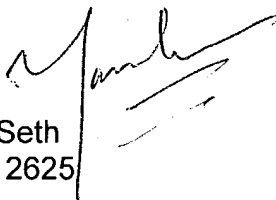
Art Unit: 2625

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manav Seth whose telephone number is (703) 306-4117. The examiner can normally be reached on Monday to Friday from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, primary examiner, Kanjibhai Patel, can be reached on (703) 305-4011. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Manav Seth
Art Unit 2625




KANJI BHAI PATEL
PRIMARY EXAMINER